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students, surprised me very much until, about three years ago, in passing Felton Hall I noticed a vacant lot close by covered with a mass of yellow bloom. Except near Salem, the plant is rarely seen in Eastern Massachusetts.

W. G. FARLOW.

Botanical Notes.

On Derivation in Pinus edulis and Pinus monophylla.—At a meeting of the Botanical Section of the Philadelphia Academy of Natural Sciences on December 8th, Mr. Thomas Meehan called attention to some dried specimens of *Pinus monophylla* on the table, which were received in a fresh condition, a few months ago, from Mrs. Lewers, of Franktown, Nevada. At that time the phyllodes which took the place of the real leaves were all monophyllous. In drying, several had opened in some specimens, and others readily separated by a little aid, showing that the species might have been two-leaved but for some inability in the early stages of development to separate them. This monophyllous species was closely allied to *Pinus edulis*, which was confined to the Rocky Mountains, the monophyllous species being the form that prevailed further west. But in a small tree of *P. edulis* growing in a deep ravine in Queen Cañon, in the Rocky Mountains he had on the same tree found monophyllous, diphyllous, and triphyllous phyllodes, and there could not possibly be any doubt that the species were of one origin. The case was one worthy of note, because it had been charged that there was no actual evidence of the truth of the doctrine of derivation. Generally, when such evidences as these were offered, the objector was prepared to abandon his belief in the specific distinctness of the forms rather than to grant that two distinct species had been developed from one parent, and even in the case of these species there were some who regarded one as but a variety of the other. But there were other distinctions: The cones were not quite the same, and the seeds were very different in size and outline, so that one could readily separate the seeds if mixed together. There was, in fact, a whole series of distinctions fully as great as we could find in many well-recognized species, and which fully entitled the two forms to full specific rank, though in the face of the evident facts that they are derivations of one original parentage. Indeed, it was well known that when a plant changed its character in one respect it must do so in others; plants in some climates annual would become perennial or suffrutescent in others. The cotton-plant was a familiar example. In such cases the foliage and other characters varied from those connected with the annual form, and from this fact some botanists had regarded *Gossypium herbaceum* and *Gossypium arboreum* as distinct species. In the case of these two species of *Pinus*, the one which could not develop its phyllodes with two separate individuals would of necessity present some peculiarities in the scales of the cone, as these were, morphologically, but transformed phyllodes. Under morphological laws, that which affected the leaves ought to affect the carpels or other parts of fructification which were modified from them.

The true position of the species in development was that *Pinus* *edulis* had the highest rank. In raising both species from seed there was no difference whatever between the seedlings during the first season. In these young and delicate plants, true leaves were perfectly developed; these were flat, linear lanceolate, and of a deep glaucous hue. *Pinus edulis* assumed stout, vigorous branches the second year; then the true leaves were suppressed, a portion only being adnate with the stem, forming a sort of cushion, or as bud-scales, or bracts under the scales of the cone, from the axis of which the phyllodes—secondary leaves, or bundles of leaves of some authors—spring. In *Pinus monophylla* only a few branches made phyllodes the second year, and, from the seed, he had plants ten years old, which continued to bear branches with true leaves almost equally with those bearing phyllodia. The monophyllous branches were never as strong as those from *Pinus edulis*, and in ten years a plant of *Pinus edulis* would be double the size of *Pinus monophylla*. Assuming, as we may, that the two had one parentage, we see that the one had less vigor of growth; it retained more of its juvenile characteristics, and retained them longer than the other; and it never reached the power of development that *Pinus edulis* had attained. We may say, with confidence, that *Pinus monophylla* sprung from the same parentage as *Pinus edulis*, and became permanently different throughout, being subjected to conditions unfavorable to a full development. It would appear that the soil and climate of Nevada were not favorable to the usual development of *Pinus edulis*, and hence, through the long course of ages, the suppressed features that characterized full maturity in the original, became, under the law of heredity, permanent ones.

It was not often that we had so clear evidence of the unity of origin in two certainly distinct species, and, as supporting the modern ideas of evolution, the case was worthy of being placed on record.

Apospory in Ferns.—W. T. T. Dyer calls attention in *Nature* to a paper by Mr. E. T. Druery (not yet published) as containing a report of one of the most interesting botanical observations that has been made for some time.

Mr. Druery's paper relates to a singular mode of reproduction in *Athyrium Fllix-fœmina*, var. *clarissima*. In this fern the sporangia do not follow their ordinary course of development, but, assuming a more vegetative character, develop more or less well-defined prothallia, which ultimately bear archegonia and antheridia. From these adventitious prothallia the production of seedling ferns of a new generation has been observed to take place in a perfectly normal way.

Mr. F. O. Bauer has confirmed Mr. Druery's observations and obtained from him specimens of another fern (*Polystichum angulare*, var. *palcherrima*) which altogether eclipses the *Athyrium*, remarkable as that is. In the *Polystichum* the apex of the pinnules grows out into an irregular prothallium, upon which was demonstrated the existence of characteristic archegonia and antherida. In this case the production of the prothallium is not even associated locally with the sporangia, but appears as a direct vegetative outgrowth of the normal spore-bearing plant. The oophore is a mere vegetative process of the sporophore, a suppression of the alternation of the two generations which exceeds even that which obtains in the flowering-plant.

Mr. Druery's discovery is the direct converse of the apogamy in ferns, discovered by Farlow. In this the sporophore is a vegetative outgrowth from the oophore. The parallel phenomena in the life-history of the moss have been known for some time. The obvious possibilities of discovery with regard to the reproduction of ferns may now be regarded as exhausted. It may be interesting to give the dates of the different steps:

1597	Gerard	Observed seedling plants near parents.
1648	Cæsius	Sporangia.
1669	Cole	Spores.
1686	Ray	Hygroscopic movements of sporangia.
1715	Morison	Raised seedlings from spores.
1788	Ehrhart	Prothallium.
1789	Lindsay	Germination of spores.
1827	Kaulfuss	Development of prothallium.
1844	Nägeli	Antheridia.
1846	Suminski	Archegonia.
1874	Farlow	Apogamy.
1884	Druery	Apospory.

—*Journ. Royal Micros. Society.*

The Life History of the Lycopodiaceæ, at least so far as regards the development of the prothallium from the spores, has until quite recently been almost unknown. Dr. Treub, however, has recently published in the Annals of the Botanic Garden of Buitenzorg, Java (Vol. iv., pp. 107, 138), a description of the prothallium of *Lycopodium cernuum*. This, according to an extract from the above paper published in *Nature* by Mr. W. T. T. Dyer, consists of a sort of short cylindrical axis, half immersed in the soil at one end, where it is furnished with root-hairs. The upper extremity bears a tuft of small leaf-like lobes. The archegonia and antheridia are found on the upper part of the cylindrical axis, forming a kind of ring or crown near the tuft of lobes.

Botanical Literature.

American Medicinal Plants. An illustrated and descriptive Guide to the American Plants used as Homœopathic Remedies ; their History, Preparation, Chemistry and Physiological Effects. By Chas. F. Millspaugh, M.D. New York and Philadelphia : Bœricke & Tafel. Nos. 1 to 5.

This is the first installment of a work which is to contain one hundred and eighty illustrations and descriptions of such native and naturalized plants as are used in homœopathic practice. Dr. Millspaugh has the advantage of being a skilful artist as well as a physician, and has thus been enabled to illustrate his work with figures drawn *in situ* by his own hand. The plates are reproduced in colors from the author's drawings, and the plants represented are in all cases quite true to nature.

The text accompanying each plate gives the systematic name, synonyms, popular name or names and minute description of the plant represented, the part used in homœopathic practice, and mode of preparation, chemical constituents and physiological action.

With the concluding part will be given a glossary of botanical